Perform the indicated operation.

40. $(6w^3+2w^2-3w-1)+(-5w^3+9w-8)$

w^3+2w^2+6w-9

41. $(-x^4+x^2-x-x^3+1)+(x^2-2x^3+4x-1)$

$-x^4-3x^3+2x^2+3x$

42. $(b^4+10b)-(4b^3+6b^2-b+5)$

$b^4+10b-4b^3-6b^2+b-5$

$b^4-4b^3-6b^2+11b-5$

43. $\left(\frac{1}{4}x^3-3x^2+\frac{5}{6}\right)-\left(\frac{1}{5}x^3-9x+\frac{2}{3}\right)$

$\frac{5}{20}x^3-\frac{4}{20}x^3-3x^2+9x+\frac{5}{6}-\frac{4}{6}$

$\frac{1}{20}x^3-3x^2+9x+\frac{1}{6}$

44. $\left(\frac{1}{2}x-\frac{1}{4}y\right)^2=\left(\frac{1}{2}x-\frac{1}{4}y\right)\left(\frac{1}{2}x-\frac{1}{4}y\right)$

$\frac{1}{4}x^2-\frac{1}{8}xy-\frac{1}{8}xy+\frac{1}{16}y^2$

$\frac{1}{4}x^2-\frac{1}{4}xy+\frac{1}{16}y^2$

45. $(2x-y)(2x+y)$

$4x^2+2xy-2xy-y^2$

$4x^2-y^2$

46. $2w^3(w^2-10w+4)$

$2w^5-20w^4+8w^3$

47. $(h-3)(h^2+2h-8)$

$h^3+2h^2-8h-3h^2-6h+24$

$h^3-h^2-14h+24$

Using a graphing calculator:

48. FInd the relative maximum(s), relative minimum(s), zeros, y-intercept of

$y=2x^3-11x^2+3x+-54$

Zero: (6,0)

Minimum of -92.506 when x = 3.525

Maximum of -53.790 when x = 0.142

Without a Graphing Calculator, Graph: (zeros, end-behavior, y-int, multiplicity)

49. $y=4x^5-40x^3+36x$ E.B. ↑

$4x(x^4-10x^2+9)$ ↓

$4x(x^2-9)(x^2-1)$

$4x(x+3)(x-3)(x+1)(x-1)$

Zeros: 0, -3, 3, -1, 1 y-int: (0,0)

Mult: 1, 1, 1, 1, 1

50. $y=(x-2)^2(x+3)(x+4)$ E.B. ↖ ↗

Zeros: 2, -3, -4

Mult: 2, 1, 1

y-int: (0, 48)

Systems & Matrices

Solve the system algebraically

51. $\begin{aligned} 4x+2y+3z&=1\\ 2x-3y+5z&=-14\\ 6x-y+4z&=-1 \end{aligned}$ $(2,1,-3)$

52. $\begin{aligned} 3x+y+z&=14\\ -x+2y-3z&=-9\\ 5x-y+5z&=30 \end{aligned}$ $(1,5,6)$

$4x+2y+3z=1$
$2(6x-y+4z=-1)$
$4x+2y+3z=1$
$12x-2y+8z=-2$
$16x+11z=-1$

$2x-3y+5z=-14$
$-3(6x-y+4z=-1)$
$2x-3y+5z=-14$
$-18x+3y-12z=3$
$-16x-7z=-11$

$16x+11z=-1$
$-16x-7z=-11$
$4z=-12$
$z=-3$

$-16x-7(-3)=-11$
$-16x+21=-11$
$-16x=-32$
$x=2$

$6(2)-y+4(-3)=-1$
$12-y-12=-1$
$-y=-1$
$y=1$

Perform the indicated operation

53. $3\begin{bmatrix}2&3\\4&1\\2&4\end{bmatrix}+\begin{bmatrix}1&-1\\-2&5\\-7&9\end{bmatrix}$

$\begin{bmatrix}6&9\\12&3\\6&12\end{bmatrix}+\begin{bmatrix}1&-1\\-2&5\\-7&9\end{bmatrix}$

$\begin{bmatrix}7&8\\10&8\\-1&21\end{bmatrix}$

54. $\begin{bmatrix}2&1&-3\\4&0&5\end{bmatrix}\begin{bmatrix}1&3\\2&4\\3&-2\end{bmatrix}$

$2\times3 \cdot 3\times2 \to 2\times2$

$\begin{bmatrix}2+2-9&6+4+6\\4+0+15&12+0-10\end{bmatrix}=\begin{bmatrix}-5&16\\19&2\end{bmatrix}$

55. $\begin{vmatrix}4&9\\-5&-11\end{vmatrix}$

-45

-44

$-44+45=1$

56. $\begin{vmatrix}2&0&8\\-1&7&9\\12&5&-3\end{vmatrix}$

672 90 0

-42 0 -40

$(-42+0-40)-(672+90+0)$

-842

57.

$$6\begin{bmatrix}6 & 4\\ 9 & -3\\ 5 & 11\end{bmatrix}-2\left(\begin{bmatrix}1 & 0\\ 5 & 3\\ 9 & 4\end{bmatrix}+\begin{bmatrix}5 & 2\\ 7 & 3\\ 9 & -4\end{bmatrix}\right)$$

$$\begin{bmatrix}36 & 24\\ 54 & -18\\ 30 & 66\end{bmatrix}-2\begin{bmatrix}6 & 2\\ 12 & 6\\ 18 & 0\end{bmatrix}$$

$$\begin{bmatrix}36 & 24\\ 54 & -18\\ 30 & 66\end{bmatrix}-\begin{bmatrix}12 & 4\\ 24 & 12\\ 36 & 0\end{bmatrix}=\begin{bmatrix}24 & 20\\ 30 & -30\\ -6 & 66\end{bmatrix}$$

58. solve for x

$$\begin{bmatrix}3 & 6\\ 8 & -5\end{bmatrix}-\begin{bmatrix}8 & 1\\ 10 & -4x\end{bmatrix}=\begin{bmatrix}-5 & 5\\ -2 & 19\end{bmatrix}$$

$-5-(-4x)=19$

$-5+4x=19$

$4x=24$

$x=6$

59. solve for x & y

$$\begin{bmatrix}-2 & 1 & 2\\ 3 & 2 & 4\\ 0 & -2 & 4\end{bmatrix}\begin{bmatrix}1\\ x\\ 3\end{bmatrix}=\begin{bmatrix}6\\ 19\\ y\end{bmatrix}$$

$-2+x+6=6$

$x+4=6$

$x=2$

$0=2(2)+12=y$

$0-4+12=y$

$8=y$

Find the inverse (without a graphing calculator0

60. $A=\begin{bmatrix}6 & -2\\ 7 & -2\end{bmatrix}$ $\det A=2$

$\frac{1}{2}\begin{bmatrix}-2 & 2\\ -7 & 6\end{bmatrix}=\begin{bmatrix}-1 & 1\\ -\frac{7}{2} & 3\end{bmatrix}$

61. $B=\begin{bmatrix}11 & -5\\ 3 & -1\end{bmatrix}$ $\det B=4$

$\frac{1}{4}\begin{bmatrix}-1 & 5\\ -3 & 11\end{bmatrix}=\begin{bmatrix}-\frac{1}{4} & \frac{5}{4}\\ -\frac{3}{4} & \frac{11}{4}\end{bmatrix}$

62. $C=\begin{bmatrix}3 & -2\\ 6 & -4\end{bmatrix}$ $\det C=0$

No inverse

Solve using the indicated method (if there is one).

63. Cramer's Rule

$x-y+2z=6$

$-2x+3y-z=-7$

$3x+2y+2z=5$

$\begin{vmatrix}1 & -1 & 2\\ -2 & 3 & -1\\ 3 & 2 & 2\end{vmatrix}=-19$

(1, -1, 2)

$x=\dfrac{\begin{vmatrix}6 & -1 & 2\\ -7 & 3 & -1\\ 5 & 2 & 2\end{vmatrix}}{-19}=\dfrac{-19}{-19}=1$

$y=\dfrac{\begin{vmatrix}1 & 6 & 2\\ -2 & -7 & -1\\ 3 & 5 & 2\end{vmatrix}}{-19}=\dfrac{19}{-19}=-1$

$z=\dfrac{\begin{vmatrix}1 & -1 & 6\\ -2 & 3 & -7\\ 3 & 2 & 5\end{vmatrix}}{-19}=\dfrac{-38}{-19}=2$